

Traffic Modeling Discussion

**Presented to the
Route 238 Working Group
July 23, 2003**

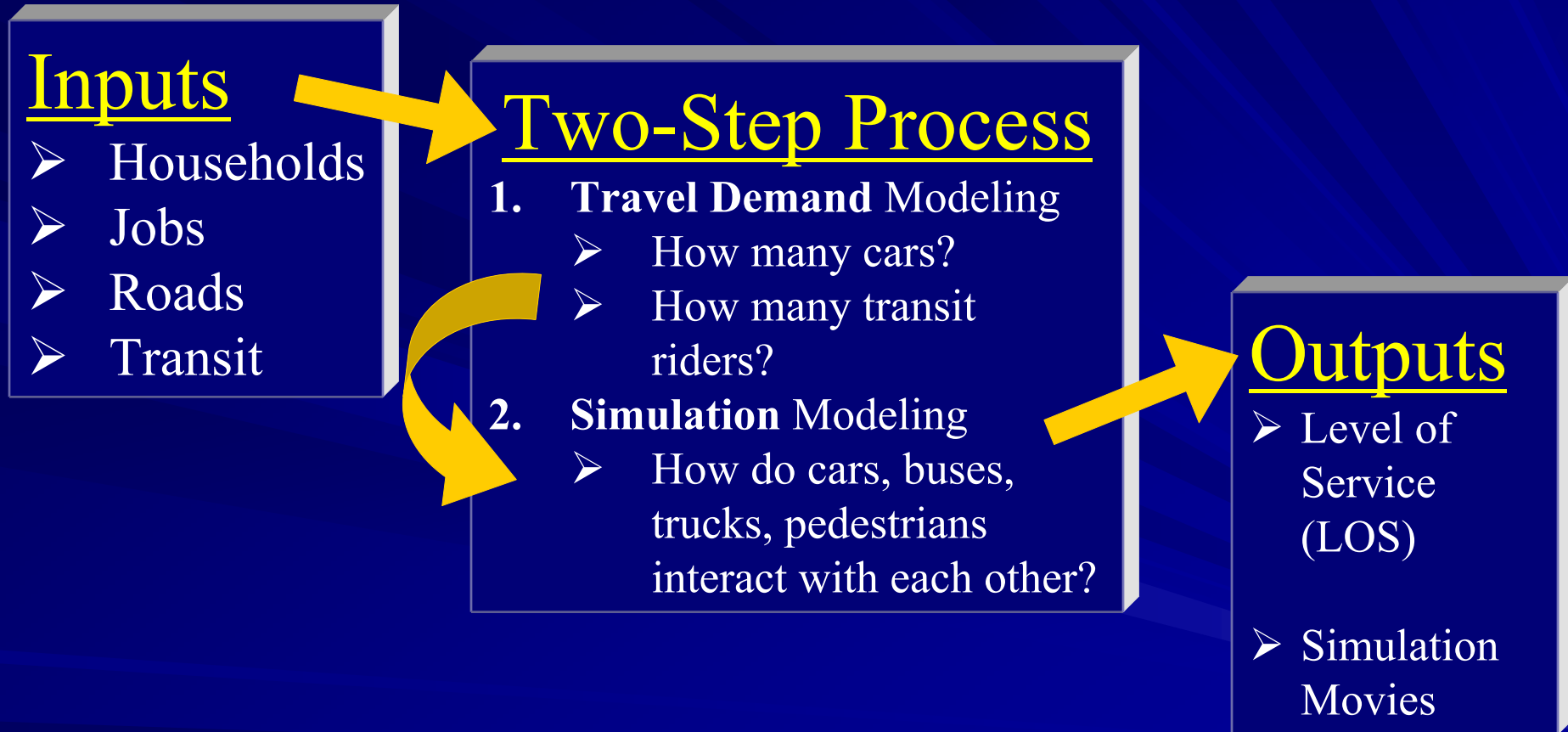
What is a Travel Demand Model?

- A systematic process for translating land use and transportation supply into projections of future travel demand
- It is not a “Crystal Ball”
- It is not a substitute for judgment
- Computers and software are not models
- Models use computers and software to manipulate large amounts of data

Our Modeling Process

- Travel Demand Model (uses EMME/2 software)
- Simulation Model (uses VISSIM software)

Our Modeling Process



Regional Modeling Framework

- Association of Bay Area Governments (**ABAG**) Projections
- Regional Transportation Plan (**RTP**)
- Consistency with Regional Models
 - Metropolitan Transportation Commission (**MTC**) Regional Model - Pricing
 - Alameda County Congestion Management Agency (**ACCMA**) Countywide Model
- Induced Demand vs. Diverted Demand

Travel Demand Models

Limitations

- A model is a **TOOL** to help us make decisions.
 - It is **NOT** a substitute for judgment
 - It **RECOGNIZES** but **DOES NOT** alter land uses
 - It has a **LIMITED** practical level of detail
 - It **CANNOT** predict extent of queues
 - It **CANNOT** accurately predict intersection turns
 - It is only **AS GOOD** as the input data

Demand Model Process Overview

■ Trip Generation

- How many trips occur in each area?

■ Trip Distribution

- How many trips travel from each area to each other area?

■ Mode Choice

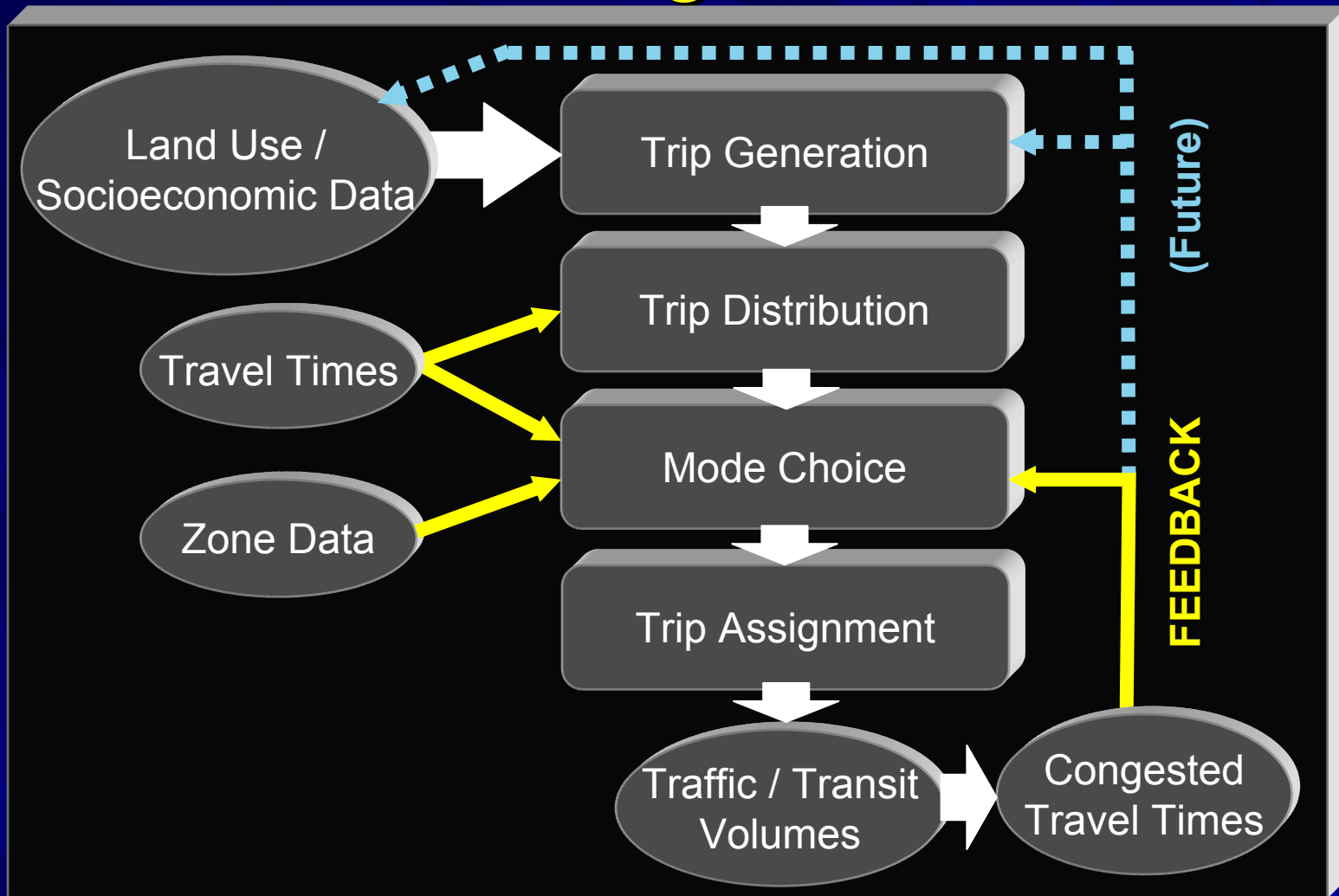
- What travel modes do they use? Auto, Bus or bike?
- MTC Mode Choice procedure

■ Trip Assignment

- What routes do the drivers and transit riders use?
- Shortest path



The Modeling “Black-Box”



Trip Generation

How many trips are generated in Hayward?

■ Trip Calculations

- Hayward Model uses regression and cross-classification

■ Trip purposes

- Home-based work
- Home-based shop
- Home-based social/recreational
- Home-based school
- Non-home based
- External (e.g., from San Joaquin County)

■ Calibrated trip rates

■ Usually generates person trips

Trip Distribution

How many trips travel within and thru Hayward?

- MTC model is calibrated against survey data
- Hayward model calibrated against MTC model
- Uses mathematical formula to distribute trips based on location of households and jobs
- Distributes based on number of trips in each area and travel times or distance between them
- Distributes person trips (except for trucks & external trips)

Mode Choice

How many people use cars, carpools, bikes or transit to travel?

- Uses MTC Mode choice
- Develops probability of using a certain mode
 - **Auto mode**
 - Drive-alone
 - Shared-ride 2
 - Shared-ride 3+
 - **Transit**
 - Bus
 - Rail

Bay Area-Wide Mode Split

- Auto 91%
- Transit 8%
- Walk / Bike 1%

Hayward Model Mode Split

- Auto 95%
- Transit 5%
- Walk / Bike N/A

Trip Assignment

Which route do residents choose to travel from households to employment?

- Assigns vehicle trips to road network (after factoring person trips using auto occupancies)
- Time of day (am-, pm-, midday-, off-peak)
- Route chosen based on shortest time, capacity constrained or equilibrium
- Factors affecting choice include road speed, length, capacity, level of congestion

The Updated Hayward Model

Key Results vs. MTC Model (2000)

- Trip Generations within **0.4%**
- Trip Distributions within **0.7%**
- Mode Choices within **3.9%** (home-based work trips only).

The Updated Hayward Model

Key Results vs. Actual Counts

■ Daily Transit Ridership

- BART boardings are **12% lower** than observed
- AC Transit boardings are **10% lower** than observed

The Updated Hayward Model

Key Results vs. Actual Counts

■ Highway Assignments

- AM Peak hour
 - screenlines are **1% higher**
 - all facilities are **0.3% higher**
- PM Peak hour
 - screenlines are **3% lower**
 - all facilities are **2.9% lower**

Microsimulation Modeling

Inputs

- Volume inputs from Demand Model
- Detailed existing and/or future roadway features (lanes, signals, etc.)
- Characteristics of individual drivers and vehicles

Microsimulation Modeling

Process

- Individual simulated vehicles “travel” through the simulated network to reach their destinations
- Model output is compared to actual conditions
- Various characteristics of model are adjusted until output is a reasonable representation

Microsimulation Modeling

Output



- Vehicle delay on roadway segments and at intersections is measured – LOS is calculated
- Travel time is measured and compared among alternatives
- Animated movies of simulated traffic conditions (vehicles and pedestrians moving around a network) can be viewed from any angle

Microsimulation Movie Sample



Working Group Questions / Answers